

Chapter 14 Long-Term Debt and Leasing

Chapter Overview

The *What Companies Do* opening feature looks at the issue of corporate bonds in Asia. These bond issues have had improving credit ratings, although interest rates remain above those in bond markets of the developed world. This outcome could reward investors, but may not last as creditworthiness increases in the emerging markets.

What Companies Do Discussion Question:

1. As students, what metrics might you use to evaluate the debt quality of a company?

This chapter discusses:

- 14-1. Characteristics of Long-Term Debt Financing
- 14-2. Corporate Loans
- 14-3. Corporate Bonds
- 14-4. Leasing

Technology

1. **Smart Video.** Annette Poulsen of the University of Chicago discusses debt covenants as performance promises made by the company.
2. **Smart Video.** Benjamin Esty of Harvard University talks about the syndicated loan market, the largest source of corporate financing.
3. **Smart Video.** Ed Altman of New York University notes that a majority of bonds are investment grade, and very unlikely to default.

After studying this chapter you should be able to:

- describe the most important characteristics of long-term debt financing, such as the factors that influence its cost and the covenants lenders include to protect their investment
- discuss the differences between the two main types of loans arranged by corporate borrowers and explain why syndicated loans have become such an attractive source of debt financing
- describe the most important types of corporate bonds issued by domestic corporations and compare these to bonds issued by international borrowers
- explain how companies decide whether to refund an existing bond issue by exercising a call option
- explain the difference between operating leases and capital, or financial, leases
- describe the steps involved in deciding whether to acquire an asset through a lease or by borrowing the money required to purchase the asset (the lease-versus-purchase decision).

Lecture Guide

Long-term debt financing is the most popular form of external financing. Companies must make several important choices in deciding on financing. The company must choose between public or private financing, using an investment bank to handle the offering – which also means higher expenses associated with the issue, and whether to issue equity or debt.

14-1 Characteristics of Long-Term Debt Financing

14-1a The Choice between Public and Private Debt Issues

A company must first choose between a private or a public debt offering. Private debt includes loans, private debt agreements between corporate borrowers and financial institutions and private placements, unregistered security offerings sold to accredited investors.

14-1b Loan Covenants

Debt covenants are designed to protect bondholders. The section discusses positive and negative covenants.

- *Student Involvement:* Ask students if debt covenants make debt financing more or less costly to the company. Most students will see that highly protected bonds should have a lower coupon interest rate since the covenants make them less risky to the investor.

14-1c Cost of Long-Term Debt

Companies must consider the term of the debt – should they finance with short-, intermediate- or long-term financing. Since yield curves are normally upward sloping, most of the time longer term financing costs more than short-term financing. However, a company has less risk with longer term financing – it has a longer period of time to earn money and repay the loan. The company must also decide how much to borrow. Usually there are economies of scale in borrowing larger amounts. The company's lenders must assess the company's probability of default and based on current economic conditions and the likelihood of default, determine a cost for the debt.

14-2 Corporate Loans

14-2a Term Loans

- **Characteristics of Term Loans**
 - This section lists more term loan terminology, including payment dates, collateral requirements, loan maturity and share purchase warrants. Share purchase warrants are options used as sweeteners for risky loans.

14-2b Syndicated Loans

Companies often turn to more creative financing to obtain the best terms. A loan may be too large for a single lender – syndicates have been developed among lenders to spread the risk of the loan. In particular, syndicated loans are strong in the Eurodollar market and in project financing, where financing is obtained for a specific project, rather than financing 'belonging' to the entire company. In project finance, typically only the assets of the project, not the entire company, secure the loan.

14-3 Corporate Bonds

A bond is a promise by a company to repay a given amount of money in a specified period of time, paying a specified interest rate.

14-3a Popular Types of Bonds

14-3b Legal Aspects of Corporate Bonds

Legal aspects of corporate bonds include bond indentures, sinking fund, security interest and bond trustee. The trustee, an individual, company or commercial bank trust department, serves as the watchdog, set to protect bondholders' interests. Trustees take their roles seriously. In the early 1990s the US-based Marriott Corporation spun off its hotel management business as a special dividend to its shareholders. It left the remaining part of the corporation, Host Marriott, as a real estate company, holding almost all of the debt of the former Marriott Corporation. Bondholders were angry – some of the bonds lost 30% of their value overnight, as the bonds were downgraded from investment grade to junk

status. Bondholders sued Marriott and while there was a small settlement to the bondholders, the courts ruled that the bond covenants did not prevent the spin-off of Marriott International as a special dividend. The bond trustee, Merrill Lynch, resigned, saying that while Marriott Corporation's actions were not illegal, the company had made it impossible to carry out its duties as trustee.

Table 14-1 Characteristics and Priority of Lender's Claims of Traditional Types of Bonds

Table 14-2 Characteristics of Some Newer Types of Debt Instruments

14-3c Methods of Issuing Corporate Bonds

Types of bonds include debentures, subordinated debentures, income bonds, mortgage bonds, collateral trust bonds, equipment trust certificates, zero coupon bonds, junk bonds, floating rate bonds, extendable notes and puttable bonds. Note that many new securities are introduced to fulfil a need – to complete the capital markets. For example, zero coupon bonds when first initiated fulfilled a need for investors who were willing to pay a smaller amount now (the discounted value of the bond) in order to receive a larger sum in the future. This kind of payoff pattern was ideal for those saving for a child's university education or for retirement. Zero coupon bonds fell out of favour with investors when the Australian Taxation Office ruled that investors would have to pay personal taxes on the implied interest the bonds paid, even though no actual interest was actually paid.

14-3d General Characteristics of a Bond Issue

It is possible that covenants could constrain the company's operations. An extreme example of this happened in the US, in the case of Burlington Northern Railroad. Burlington Northern issued a 100 and a 150 year bond issue in the late 1890s. At the time of the issue railroads were king, and the land grants given to the railroad were of less importance. By the late 1980s, this situation was reversed. Making further investments in the railroad business was not profitable, while the mineral and development rights to the land were very valuable. Unfortunately, the bonds had a restrictive covenant that all earnings from development of the land would have to be reinvested in the railroad business. This was a covenant that made sense at the time the bonds were issued – investing in railroads was a highly positive net present value enterprise at that time. The Burlington bonds also were not callable and 100% of bondholders had to agree to a change in a covenant. Burlington had to negotiate with its bondholders and give them a monetary settlement to induce them to allow the bonds to be retired.

14-3e High-Yield Bonds

Bonds rated below investment-grade are known as high-yield bonds, or junk bonds, and they carry a much higher default risk than investment-grade bonds, but also offer higher yields. Figure 14.1 shows, however, the US junk bond market not only survived but prospered after the early 1990s. Junk bond investors recognise that they are assuming much of the issuing company's business risk when they purchase high-yield debt, but they are willing to do so in return for promised yields that approach the returns earned by shareholders.

14-3f International Corporate Bond Financing

This section distinguishes between eurobonds and foreign bonds. A Eurobond is issued in a foreign country in the company's home currency. Australian Eurobonds are those issued in Australian dollar denominations in a foreign country. Foreign bonds are issued in foreign countries and denominated in the foreign currency. While it makes sense to call a dollar bond issued in Europe a Eurobond, a yen-denominated bond in Europe is also a Eurobond as is a dollar denominated bond issued in Japan. Foreign bonds are issued in a foreign currency; in other words an Australian company issuing yen bonds in Japan or a French company issuing dollar denominated bonds in the US.

Fig. 14-1 Face Value Amounts Outstanding and Default Rates for High-Yield Bonds (Junk Bonds), 1971–2008

14-3g Bond Refunding Options

Companies typically continue to reissue bonds over the life of the company. Serial bonds are those with staggered maturities. Companies may refinance bond issues by calling the bonds and then reissuing them. The company must look at the expenses associated with refinancing versus the benefits of financing at a lower interest rate than the bonds' current rate in order to decide if financing is worthwhile at a particular point in time.

- **Bond Refunding Analysis**

- This section looks at the steps a company must take in order to decide if refinancing will add economic value at a given point in time. A detail example is also included if needed for clarification.

Table 14.3 Finding the Initial Investment for the Davis Company's Bond Refunding Decision

Table 14.4 Finding the Annual Cash Flow Savings for the Davis Company's Bond Refunding Decision

Table 14.5 Finding the NPV of the Davis Company's Bond Refunding Decision

14-4 Leasing

Leasing is another form of debt financing. The lease payments are like interest payments, a fixed amount due at specified times, just as interest is due on bonds.

14-4a Basic Types of Leases

The section distinguishes between finance and operating leases. While the lines can be a little blurred between the two types of leases, in operating leases the leasing company, the lessee, agrees to make periodic payments to the lessor to obtain an asset's services. Finance leases are non-cancellable and obligate the lessee to make lease payments, even if the asset is no longer needed. Finance leases are basically a form of long-term debt financing.

14-4b Lease Arrangements

Covers lease terminology and the different kinds of leasing arrangements a company can enter into.

14-4c The Lease Contract

A lease agreement specifies which party is responsible for maintenance. Often the lessor will be responsible for maintenance, since this is an asset that belongs to the lessor, even though the lessee is using the asset.

- *Student Involvement:* Ask students what are the incentives the lessee has to pay maintenance costs. Why are there differences between maintenance agreements with finance vs operating leases?

14-4d The Lease-versus-Purchase Decision

Most lenders look at the company's debt plus finance lease obligations in evaluating whether or not a company can take on more debt. Note that the lease vs buy decision is simply another decision that can be made using discounted cash flow analysis. The least costly choice is the one that the company should accept.

Table 14-6 Lease vs Purchase Analysis for ClumZee Movers: After-Tax Cash Flows (\$)

14-4e Effects of Leasing on Future Financing

Most lenders consider leases to be a form of debt financing and will look at the company's lease commitments in making the decision to lend more money to the company. If the company has a relatively

small amount of debt but very high lease commitments, the lender is likely to assess the company's creditworthiness on the basis of its ratios with lease obligations included.

14-4f Advantages and Disadvantages of Leasing

This section details all of the commonly cited advantages and disadvantages of leasing versus buying.

Long-Term Debt and Leasing, Summary

Chapter 14 Resource Articles

'Lower Rates Revive Junk Bonds as Investors Regain their Interest,' *Wall Street Journal*, 17 January 2001. Continued lowering of interest rates has made junk bonds more attractive. The article notes that the last time the US was in a recession in 1991, the junk bond market was hot, returning on average 37%.

'There Goes the Cheap Money,' *Business Week*, 15 April 2002. After the Enron scandal, borrowers turned from commercial paper to longer term debt. High grade, short-term debt became increasingly harder to obtain, forcing more companies into the higher cost, long-term debt market.

Answers to Concept Review Questions

1. When deciding on the amount and type of long-term debt to be used to finance a business, a manager must consider if the debt financing should be private – loan or private placement – or a registered public offering. The manager needs to look at the transactions costs associated with each option, matched with the use of the funds – how much money is needed immediately? Will more money be needed in the near future? Several years down the road? Should the financing be long or short term? How much should be borrowed? Transactions costs decrease per dollar borrowed, but the risk to the lender increases with size.
2. When negotiating the covenants in a long-term debt agreement, a manager does not want to have covenants that are too restrictive or that will constrain operations. Yet, managers want sufficient covenants so that bondholders feel protected and will lower the cost of debt because of those protections. Protective covenants reduce the risk of the loan and may allow a riskier borrower to obtain debt.
3. When estimating the companies' cost of long-term debt prior to meeting with a lender, a manager should first look at the equivalent risk-free rate – 10 year Treasury bond if the company is borrowing for 10 years, 20 year Treasury if borrowing for 20 years, etc. The managers should add on a risk premium. If managers can approximate the company's bond rating, they can look up rates for bonds of that maturity.
4. When a specialty retail company takes out a term loan from a bank, the lender would probably prefer receivables as collateral rather than inventory. Specialty inventory might be difficult to sell and might not realise full value. Receivables are more likely to be collected and would be preferable as collateral for a loan.
5. Collateral is all or part of a company's assets. If the company is financially distressed and potentially unable to pay its debts, it is because the cash flows generated by the assets are not sufficient for the company's needs. The assets' value is determined by the present value of their future expected cash flows. As the cash flows decline, the value of the assets (collateral) will also decline. As a company becomes more financially distressed, its market value (value of its debt plus equity) also declines.

6. The dispersion of risk is attractive to syndicated lenders. A single lender does not bear all of the risk of a large loan; it is shared by a group of lenders. This leaves the lender less vulnerable if the borrower defaults.
7. Syndicated loans are valuable to companies involved in corporate takeovers because they allow the company to borrow large sums quickly and relatively discreetly. The acquiring company may not want the takeover to be publicised to avoid other potential bidders from stepping in and possibly bidding up the price of the target company.
8. Project finance loans differ from other types of syndicated loans in that they are extended to stand-alone (vehicle) companies created for the sole purpose of constructing and operating a single project. These loans are almost always limited or non-recourse credits, backed only by the assets and cash flows of the project, not by the parent company. This has the advantage of making it easy for the lender to separate out the project cash flows from the rest of the company, and perhaps value the assets more easily, but it also means the lender cannot attach the non-project assets of the sponsoring company if the vehicle company defaults on the loan.
9. When choosing between a term loan and a bond issue for funding long-term debt, a manager should consider that bank loans are generally short to intermediate term. A company looking for very long term financing may prefer corporate bonds. Again, the company needs to consider the costs of each type of financing, disclosure requirements, restrictive covenants, etc. to determine which choice of financing works best for the company, given its collateral, its present and future financing needs and its cash flow levels and stability.
10. A portion of a serial bond issue matures each year, with differing interest rates attached to the bonds maturing at different times. They cannot be retired at the option of the issuer, but they do allow systematic retirement of the debt. In a bond with a sinking fund, the sinking fund may be of the type in which a set amount of bonds is retired yearly, similar to serial bonds. However, the bond issue would carry a single interest rate. Or, the sinking fund could be of the type where the company puts a certain amount of money into an escrow account, unable to be used for the company's investments or operations, but earning interest for the company while waiting for the bond issue to mature. Again the company will want to consider the cost of debt and transactions costs in making a decision between the two types of bonds.
11. Factors, other than the current interest rate at which new debt could be sold, a manager should consider when deciding to refund a bond issue include the call premium – what amount above the face value of the bonds will be paid to bondholders because the bonds are called before maturity. What are the transactions costs associated with calling the old bond issue and issuing new bonds? Do the savings from a lower interest rate compensate for the up-front costs of calling and reissuing bonds on a discounted cash flow basis? If the answer is yes, the bonds should be refunded.
12. The classification of a lease as finance or operating affects where that lease appears on the company's financial statements. An operating lease is an expense, and will appear with the company's other operating expenses on its balance sheet. A finance lease will appear on the company's balance sheet with the asset under 'Other Assets' and the obligation under 'Other Liabilities.'
13. When deciding between leasing an asset and borrowing funds to purchase the asset, the company needs to look at the tax implications of the lease vs buy decision. In an operating lease, the lessor owns the asset and receives the tax benefit of depreciating that asset. Presumably some of that savings will be passed on in the form of a lower lease payment for the lessee. But if the cost of the lease is too high, the company might be better off borrowing the money and purchasing the asset. Only a discounted cash flow analysis comparing the options can answer the question of which option is more advantageous for the company.

Answers to Self-Test Problems

ST14-1. The initial proceeds per bond, the size of the issue, the initial maturity of the bond, and the years remaining to maturity are shown in the following table for a number of bonds. Each bond has \$1,000 face value, and the issuing company is in the 35% tax bracket.

Bond	Proceeds per Bond	Size of Issue	Initial Maturity of Bond	Years Remaining to Maturity
A	\$ 975	50,000 bonds	10 years	5 years
B	1,020	25,000 bonds	20	15
C	1,000	100,000 bonds	25	12

- Indicate whether each bond was sold at a discount, at a premium, or at its face value.
- Determine the total discount or premium for each issue.
- Determine the annual amount of discount or premium amortised for each bond.
- Calculate the unamortised discount or premium for each bond.
- Determine the after-tax cash flow associated with the retirement now of each of these bonds, using the values developed in part (d).

A: Premium/Discount per bond = Proceeds per bond – Face value per bond
 Total Premium/Discount = Premium/Discount per bond × Size of issue (# of bonds)
 Annual premium/Discount amortised per bond = Premium/Discount per bond ÷ Initial maturity (in years)
 [Premiums added to earnings each year, so increase taxable income and taxes paid;
 Discounts deducted from earnings each year, so reduce taxable income and taxes paid]
 Unamortised premium/Discount per bond = Annual prem/Disc per bond × Number years remaining
 After-tax cash flow = [– (Unamortised pre/disc per bond × Size of issue × Corporate tax rate)]
 [Retiring premium bonds: remaining prem realised as income, increasing taxes payable;
 Retiring discount bonds: remaining disc deducted from income, reducing taxes payable]

Bond	Premium (+) or Discount (–) per Bond	Total Premium or Discount per Bond	Annual Premium or Discount per Bond	Unamortised Premium or Discount per Bond	After-Tax Cash Flows from Retiring Issue
A	–\$25.00	–\$1,250,000	–\$2.50	–\$12.50	+\$218,750
B	+20.00	+500,000	+1.00	+15.00	–131,250
C	0	0	0	0	0

ST14-2. The principal, coupon interest rate, and interest overlap period are shown in the following table for several different bonds.

Bond	Principal	Coupon Interest Rate	Interest Overlap Period
A	\$15,000,000	6.5%	2 months
B	20,000,000	7.0%	3
C	15,000,000	6.0%	4
D	100,000,000	8.0%	6

- Calculate the dollar amount of interest that must be paid for each bond during the interest overlap period.
- Calculate the after-tax cost of overlapping interest for each bond if the company is in the 40% tax bracket.

- A:** Interest payable during overlap = Coupon rate \times Principal \times [Months overlap \div 12]
 After-tax cost of overlapping interest = Interest during overlap period \times (1 – Tax rate)

Bond	Calculation of Interest Payable During Overlap Period	Interest Payable During Overlap Period	After-Tax Cost of Overlapping Interest
A	$\$15,000,000 \times 0.065 \times [2 \div 12]$	\$ 162,500	\$ 97,500
B	$20,000,000 \times 0.07 \times [3 \div 12]$	350,000	210,000
C	$15,000,000 \times 0.06 \times [4 \div 12]$	300,000	180,000
D	$100,000,000 \times 0.08 \times [6 \div 12]$	4,000,000	2,400,000

- ST14-3.** Well-Sprung Pty Ltd is considering offering a new \$100 million bond issue to replace an outstanding \$100 million bond issue. The company wishes to take advantage of the decline in interest rates that has occurred since the original issue. The two bond issues are described in what follows. The company is in the 30% tax bracket.

Old bonds. The outstanding bonds have \$1,000 face value and an 8.5% coupon interest rate. They were issued five years ago with a 20-year maturity. They were initially sold at a \$30 per bond discount, and a \$750,000 flotation cost was incurred. They are callable at \$1,085.

New bonds. The new bonds would have a 15-year maturity, a face value of \$1,000, and a 7.0% coupon interest rate. It is expected that these bonds can be sold at face for a flotation cost of \$600,000. The company expects a 3-month period of overlapping interest while it retires the old bonds.

- Calculate the initial investment that is required to call the old bonds and issue the new bonds.
- Calculate the annual cash flow savings, if any, expected from the proposed bond-refunding decision.
- If the company uses its 4.9% after-tax cost of debt to evaluate low-risk decisions, find the net present value (NPV) of the bond-refunding decision. Would you recommend the proposed refunding? Explain your answer.

- A:** Steps in bond refunding decision: (1) Calculate the initial investment required to call the old bond issue and float the new one; (2) Find the annual cash flow savings from the new versus old bond issue, and; (3) Find the net present value of the refunding decision. Answers to parts a-f of this problem will be determined with this procedure.

(1) Finding the Initial Investment for the Bond Refunding Decision

(a) Call premium	
Before tax $[(\$1,085 - \$1,000) \times 100,000 \text{ bonds}]$	\$8,500,000
Less: Taxes $(0.30 \times \$8,500,000)$	<u>(2,550,000)</u>
After-tax cost of call premium	\$5,950,000
(b) Flotation cost of new bond	650,000
(c) Overlapping interest on old bond	
$0.085 \times \$100,000,000 \times 3/12 \times (1 - 0.3)$	1,487,500
(d) Tax savings from unamortised discount on old bond	
$-\$30 \div 20 \times 15 \times 100,000 \times 0.30$	(675,000)
(e) Tax savings from unamortised flotation of old bond	
$(15 \div 20 \times \$750,000 \times 0.30)$	<u>(168,750)</u>
Initial investment	<u><u>\$7,243,750</u></u>

(2) Finding the Annual Cash Flow Savings for Bond Refunding Decision

Old bond

(a) Interest cost	
Before tax $(0.085 \times \$100,000,000)$	\$8,500,000
Less: Taxes $(0.30 \times \$8,500,000)$	<u>(2,550,000)</u>
After-tax interest cost	\$5,950,000
(b) Tax savings from amortisation of discount	
$-\$30 \div 20 \times 100,000 \times 0.30$	(45,000)
(c) Tax savings from amortisation of flotation cost	
$[(\$750,000 \div 20) \times 0.30]$	<u>(11,250)</u>
(1) Annual after-tax debt payment	\$5,893,750

New bond

(d) Interest cost	
Before tax $(0.070 \times \$100,000,000)$	\$7,000,000
Less: Taxes $(0.30 \times \$7,000,000)$	<u>(2,100,000)</u>
After-tax interest cost	\$4,900,000
(e) Tax savings from amortisation of flotation cost	
$[(\$600,000 \div 15) \times 0.30]$	<u>(12,000)</u>
(2) Annual after-tax debt payment	<u>\$4,888,000</u>
Annual cash flow savings $[(1) - (2)]$	<u><u>\$1,005,750</u></u>

(3) Finding the Net Present Value of the Bond Refunding Decision

(a) Present value of annual cash flow [from part (2)]	
$\$1,005,750 \times PVA_{4.9\%, 15 \text{ years}} = \$1,005,750 \times 10.450$	\$10,510,264
(b) Less: Initial investment (from (1))	<u>(7,243,750)</u>
(c) Net present value (NPV) of refunding	<u><u>\$ 3,266,514</u></u>

Decision: The proposed refunding is recommended because the NPV of refunding of \$3,266,514 is greater than \$0.

ST14-4. The Strident Company is attempting to determine whether to lease or purchase a new telephone system. The company is in the 40% tax bracket, and its after-tax cost of debt is currently 4.5%. The terms of the lease and the purchase are as follows:

Lease. Annual beginning-of-year lease payments of \$22,000 are required over the 5-year life of the lease. The lessee will exercise its option to purchase the asset for \$30,000, to be paid along with the final lease payment.

Purchase. The \$100,000 cost of the telephone system can be financed entirely with a 7.5% loan requiring annual end-of-year payments of \$24,716 for five years. The company in this case will depreciate the equipment using the straight-line method over five years. The company plans to keep the equipment and use it beyond its 5-year recovery period.

- Calculate the after-tax cash outflows associated with each alternative.
- Calculate the present value of each cash outflow stream using the after-tax cost of debt.
- Which alternative – lease or purchase – would you recommend? Why?

A: Leasing the research equipment

Beginning of period lease payment: \$22,000

After-tax lease payment = $22,000 \times (1 - 0.4) = \$13,200$

N = 5 years

After-tax cost of debt: 4.5%

Present value of lease cash flows, beginning of years 1–5 (end of years 0–4):

$-\$13,200 - 13,200/1.045 - 13,200/(1.045)^2 - 13,200/(1.045)^3 - 13,200/(1.045)^4 = \underline{\underline{-\$85,712}}$

Purchasing the equipment

\$100,000 equipment cost

Depreciation, based on MACRS table:

Year 1:	$20\% \times 100,000 =$	\$20,000
Year 2:	$32\% \times 100,000 =$	\$32,000
Year 3:	$19.2\% \times 100,000 =$	\$19,200
Year 4:	$11.52\% \times 100,000 =$	\$11,520
Year 5:	$11.52\% \times 100,000 =$	\$11,520
Year 6:	$5.76\% \times 100,000 =$	\$ 5,760

Loan interest and principal:

Year	Principal Balance	Payment	Interest	Principal	Ending Principal
1	\$100,000	\$24,716	\$7,500	\$17,216	\$82,784
2	82,784	\$24,716	6,209	18,508	64,276
3	64,276	\$24,716	4,821	19,896	44,380
4	44,380	\$24,716	3,329	21,388	22,992
5	22,992	\$24,716	1,724	22,992	0

Loan cash flows:

Note that there are no inflows (revenues) given for the project. The cash inflows are the tax shields from depreciation and interest, the amount paid times the tax rate of 40%.

Maintenance costs: \$3,500

After-tax cost of maintenance: $\$3,500 \times (1 - 0.4) = \$2,100$

After-tax cash outflows associated with purchasing the telephone system:

End of Year	Loan Payments (1)	Maint. Costs (2)	Deprec (3)	Interest (4)	Total Deductions 2+3+4=(5)	Tax Shields 0.40×5=(6)	After-Tax Cash Outflows 1+2-6=(7)
1	\$24,716	\$3,500	20,000	\$7,500	\$31,000	\$12,400	\$15,816
2	\$24,716	\$3,500	32,000	6,209	41,709	16,684	11,532
3	\$24,716	\$3,500	19,200	4,821	27,521	11,008	17,208
4	\$24,716	\$3,500	11,520	3,329	18,349	7,340	20,876
5	\$24,716	\$3,500	11,520	1,724	16,744	6,698	21,518

Discounting the after-tax cash outflows at 4.5%: -\$75,547

Since the present value of the after-tax cash outflows for the purchase alternative, -\$75,547, is less than for the lease alternative, -\$85,712, it is less costly to purchase than to lease the equipment. This ignores the depreciation deduction for the purchase option for year 6, as well as year-6 maintenance payments made under the lease option after the asset is purchased in year 5.

Answers to End-of-Chapter Questions

- Q14-1.** Comment on the following proposition: The use of floating-rate debt eliminates interest rate risk (the risk that interest payment amounts will change in the future) for both the borrower and the lender.
- A14-1.** Floating rate debt eliminates interest rate risk for the lender – who will always be receiving the market interest rate on the debt. This makes the loan less risky for the lender and so these loans usually carry lower interest rates than fixed rate debt. For the company, however, if they are using floating rate debt to finance long-term assets, they run the risk of having difficulty with payments if the asset will not return cash flows until later in the life of the project. Floating rate debt is more appropriately used to finance short-term assets, like current assets.
- Q14-2.** What purpose do *loan covenants* serve in a debt agreement? What factors should a manager consider when negotiating covenants?
- A14-2.** Covenants protect bondholders, reduce bondholder-shareholder conflicts and lower the cost of debt because of those protections. Protective covenants reduce the risk of the loan and may allow a riskier borrower to obtain debt.
- Q14-3.** List and briefly discuss the key features that distinguish long-term debt issues from each other.
- A14-3.** Debt issues differ according to maturity (when the debt must be repaid), loan size (how much is borrowed), borrower risk and the basic cost of money. The cost of money depends on the risk-free rate and the amount of risk premium a lender will charge based on borrower risk.
- Q14-4.** Define the following: *term loan*, *balloon payment*, *collateral*, and *share purchase warrants*.
- A14-4.** A term loan is a loan made by a financial institution to a company. It lasts at least a year and generally lasts 5-12 years. Typically term loans are made to finance permanent working capital needs, to pay for machinery and equipment or to liquidate other loans. A balloon payment occurs when the loan requires small intermediate payments and a final large payment at the maturity of the loan. Collateral refers to the assets that back up a loan, assets that the lender can repossess if the company defaults on the loan. Share purchase warrants are generally used as sweeteners to a risky loan agreement, allowing the lender to purchase shares, and therefore share in the upside potential if the company does well.

Q14-5. What is a *syndicated loan*? Why have these loans proven so popular with corporate borrowers?

A14-5. A syndicated loan is a large-denomination credit arranged by a group or syndicate of commercial banks for a single borrower. The syndicated loan market appeals to creditworthy borrowers who need to arrange very large loans quickly.

Q14-6. What is a *project finance (PF) loan*? What role does a stand-alone company play in the typical project finance deal?

A14-6. A project finance loan is a limited or non-recourse loan, often arranged to finance large infrastructure projects. This kind of loan means that if the project being financed defaults, the lender can only claim the assets of the project, not the assets of the entire company.

Q14-7. What is a *debenture*?

A14-7. A debenture is a secured bond issued by a creditworthy company, usually secured over property. In the US, a debenture is an unsecured bond backed only by the creditworthiness of the company. The difference in meaning between the Australian and New Zealand, and US definitions, is unfortunately confusing.

Q14-8. How do *sinking funds* reduce default risk?

A14-8. Sinking fund requirements reduce the default risk of bonds because they require the company to either buy back a portion of the bonds each year, reducing the total amount of the debt, or they require the company to set aside money in an escrow account to ultimately use to pay back the bonds. Under either type of sinking fund, the company is not responsible for paying the full amount of the bond at maturity – it already has been forced to 'save' for this repayment before the bonds are due.

Q14-9. What is a *trustee*? Why do bondholders insist that a trustee be included in all public bond offerings? Why are these less necessary in private debt placements?

A14-9. A trustee is an individual, company or a commercial bank trust department designated to look out for the interests of bondholders. This is required for public bond issues. When there is a diverse body of bondholders, a single party is needed to monitor the company and make sure bond covenants are followed. In a private placement there is a single lender who is in a better position to monitor the company and verify the borrower is acting in a way to ensure repayment of the bond.

Q14-10. What impact has adoption of Rule 144A had on debt-issuance patterns in the United States?

A14-10. Rule 144A allowed institutional investors to trade non-registered securities among themselves. This created greater liquidity than exists with traditional private placements. Such non-registered securities are less costly than traditional public offerings. This made the market for private debt more desirable.

Q14-11. Why are most corporate bonds callable? Who benefits from this feature, and what is the cost of adopting a call provision in a public bond issue?

A14-11. A call feature allows a company to recall its bonds before their maturity and reissue them if desired. This feature is advantageous to the issuer. For example, when interest rates fall, it might be desirable for a company to call its bonds and reissue them at a lower interest rate. Callable bonds require a slightly higher interest rate than would an equivalent non-callable issue.

to compensate investors for the possibility that they will not be able to hold the bonds to maturity.

Q14-12. Why do corporations have their debt rated? Compare the role played by ratings agencies and a company's outside auditors.

A14-12. Companies have their bonds rated by bond rating agencies so that the investing public has the assessment from an independent source concerning the quality of the company. Investors then do not have to take the word of the company about its ability to repay – it is verified and graded by an independent agency. This is a role similar to that played by auditors; however the rating agencies are not verifying all of the company's financial information; they are just looking at the ability to repay a particular debt issue.

Q14-13. What does *investment grade* mean in the context of corporate bond issues? How do these bonds differ from *junk bonds*, and why have the latter proven so popular with investors?

A14-13. Investment grade bonds are the four top grades – all A grades and the highest B (BBB or Baa) rating. Many institutions are only allowed to purchase investment grade bonds, the highest quality bonds. Junk bonds have ratings of BB (Ba) or below. Some companies issue lower-rated debt directly. These are companies that generally have a great deal of debt and do not qualify for higher ratings. Other companies have debt that starts out as investment grade. Then if the company's fortunes decline the bond ratings agencies may downgrade a bond to junk bond levels. These bonds are called 'fallen angels.' Junk bonds have been very popular because they offer higher yields than investment-grade bonds.

Q14-14. What is a *Eurobond*? Why did these bonds come into existence? Why do Eurobond investors like the fact that these are typically 'bearer bonds'? What risk does an investor run from holding bearer bonds rather than registered bonds?

A14-14. A Eurobond is a bond issued by an international borrower and sold to investors in countries with currencies other than the currency in which the bond is denominated. This market developed to satisfy European investors who wanted to hold dollar-denominated bearer bonds. Bearer bonds were desirable because they could shelter investment income from taxation, since bearer bonds were unregistered, and the interest paid to investors is not reported to tax authorities by the issuer. Under-reporting tax income is, however, illegal. Dollar-denominated bonds also provided protection against exchange rate risk.

Q14-15. Explain how uncertainty concerning future interest rates would affect the decision to refund a bond issue.

A14-15. If interest rates fall, it may lower the company's costs by calling and then refunding the bond issue with bonds carrying a lower interest rate. Before making this decision, the company must look at the fees and transactions costs involved in the transaction. Uncertainty about future interest rates will impact this decision. For example, suppose interest rates have been falling. The company must forecast whether interest rates are at their low point, or if they will fall further in the future, making it more advantageous to call an issue at a later time.

Q14-16. Define the following: *direct lease*, *sale-leaseback arrangement*, *leveraged lease*, and *finance lease*. What elements must be included in a lease in order for it to be considered a finance lease?

A14-16. A direct lease results when a lessor acquires the assets that are leased to a given lessee. In other words, the lessee did not previously own the assets it is leasing. In a sale-leaseback arrangement, one company sells an asset to another for cash, then leases the asset from its

new owner. In a leveraged lease, one or more third-party lenders are involved. A finance lease is a long-term lease that is non-cancellable and obligates the lessee to make payments over a predefined period.

A finance lease must have one of the following characteristics:

- Lease transfers ownership of the property to the lessee at the end of the lease term.
- Lease contains an option to purchase the property at a bargain price at the end of the lease period.
- The lease term is equal to 75% or more of the estimated economic life of the property.

Q14-17. How would the availability of floating-rate debt affect the lease-versus-purchase decision?

A14-17. A lease does not have a stated interest cost. A company might be better off borrowing and then purchasing the asset. A choice of fixed versus floating rate debt could impact the lease or buy decision. If a company purchases an asset and finances the purchase with fixed rate debt, then it knows what its borrowing costs will be, just as if a company leases it knows what its costs will be. If a company borrows using floating rate debt, then it will not know its final costs until the loan is repaid.

Q14-18. For acquiring an asset, what are the key advantages of leasing as compared to borrowing? What are the key disadvantages of leasing?

A14-18. The main advantages of leasing are

- Allows the lessee to effectively depreciate land
- May permit the company to increase its liquidity by converting assets into cash, which can then be used as working capital.
- Leasing provides 100% financing. Many loan agreements require a down payment.
- When a company reorganises or goes insolvent, the lessor can take back its leased assets quickly and relatively easily. A borrower may hold one of many claims against a company's assets in the event of insolvency.
- The company may avoid the cost of obsolescence if the lessor does not accurately anticipate the obsolescence of assets and sets the lease payments too low.
- The lessee avoids potentially restrictive bond covenants.
- Leasing may provide more financing flexibility.

Disadvantages of leasing include:

- A lease does not have a stated interest cost, and borrowing may be less costly for the company.
- At the end of a lease agreement, the lessor realises the salvage value, not the lessee.
- A lessee is generally prohibited from making improvements on a leased property or asset without the approval of the lessor.

If a leased asset becomes obsolete, the lessee must still make lease payments over the remaining life of the lease.

Solutions to End-of-Chapter Problems**Corporate Bonds**

P14-1. The initial proceeds per bond, the size of the issue, the initial maturity of the bond, and the years remaining to maturity are shown in the following table for a number of bonds. In each case the bond has \$1,000 face value, and the issuing company is in the 40% tax bracket.

Bond	Proceeds per Bond	Size of Issue	Initial Maturity of Bond	Years Remaining to Maturity
A	\$ 985	10,000 bonds	20 years	15 years
B	1,025	20,000	25	16
C	1,000	22,500	12	9
D	960	5,000	25	15
E	1,035	10,000	30	16

- Indicate whether each bond was sold at a discount, at a premium, or at its face value.
- Determine the total discount or premium for each issue.
- Determine the annual amount of discount or premium amortised for each bond.
- Calculate the unamortised discount or premium for each bond.
- Determine the after-tax cash flow associated with the retirement now of each of these bonds, using the values developed in part (d).

A14-1. Premium/discount per bond = Proceeds per bond – Face value per bond

Total Premium/discount = Premium/Discount per bond × Size of issue (# of bonds)

Annual premium/discount amortised per bond = Prem/Disc per bond ÷ Initial maturity (in years)

[Premiums added to earnings each year, so increase taxable income and taxes paid;

Discounts deducted from earnings each year, so reduce taxable income and taxes paid]

Unamortised premium/discount per bond = Annual prem/Disc per bond × Number years remaining

After-tax cash flow = [– (Unamortised premium/discount per bond × Size of issue × Corporate tax rate)]

[Retiring premium bonds: remaining premium realised as income, increasing taxes payable;

Retiring discount bonds: remaining discount deducted from income, reducing taxes payable]

Bond	Premium (+) or Discount (–) per Bond	Total Premium or Discount per Bond	Annual Premium or Discount per Bond	Unamortised Premium or Discount per Bond	After-Tax Cash Flows from Retiring Issue
A	–\$15.00	–\$150,000	–\$0.75	–\$11.25	+\$45,000
B	+25.00	+500,000	+1.00	+16.00	–128,000
C	0	0	0	0	0
D	–40.00	–200,000	–1.60	–24.00	+48,000
E	+35.00	+350,000	+1.17	+18.67	–74,667

- P14-2.** For each of the callable bond issues in the following table, calculate the after-tax cost of calling the issue. Each bond has a \$1,000 face value, and the various issue sizes and call prices are shown in the table. The company is in the 40% tax bracket.

Bond	Size of Issue	Call Price
A	12,000 bonds	\$1,050
B	20,000	1,030
C	30,000	1,015
D	50,000	1,050
E	100,000	1,045
F	500,000	1,060

- A14-2.** Call premium per bond = Call price – Face value

Total call premium = Call premium per bond × Size of issue (# of bonds)

After-tax cost of calling bond issue = Total call premium × (1 – Tax rate)

Bond	Call Premium per Bond	Total Call Premium	After-Tax Cost of Calling Issue
A	\$50	\$ 600,000	\$ 360,000
B	30	600,000	360,000
C	15	450,000	270,000
D	50	2,500,000	1,500,000
E	45	4,500,000	2,700,000
F	60	30,000,000	18,000,000

- P14-3.** The flotation cost, the initial maturity, and the number of years remaining to maturity are shown in the following table for a number of bonds. The company is in the 40% tax bracket.

Bond	Flotation Cost	Initial Maturity of Bond	Years Remaining to Maturity
A	\$250,000	30 years	22 years
B	500,000	15	5
C	125,000	20	10
D	750,000	10	1
E	650,000	15	6

- Calculate the annual amortisation of the flotation cost for each bond.
- Determine the tax savings, if any, expected to result from the unamortised flotation cost of each bond if it were called today.

- A14-3.** Annual flotation cost amortisation = Flotation cost ÷ Initial maturity (# years)
[Charged against income each year, reducing taxable income and taxes payable]

Total unamortised flotation costs (TUFC) =
Annual amortisation amount × Years remaining

Tax savings from realising unamortised flotation cost = TUFC × Tax rate

Bond	Annual Amortisation of Flotation Costs	Total Unamortised Flotation Costs	Tax Savings from Realising Unamortised Flotation Costs
A	\$ 8,333	\$183,333	\$ 73,333
B	33,333	166,667	66,667
C	6,250	62,500	25,000
D	75,000	75,000	30,000
E	43,333	260,000	104,000

P14-4. The principal, coupon interest rate, and interest overlap period are shown in the following table for five different bonds.

Bond	Principal	Coupon Interest Rate	Interest Overlap Period
A	\$ 5,000,000	8.0%	3 months
B	40,000,000	7.0	2
C	50,000,000	6.5	3
D	100,000,000	9.0	6
E	20,000,000	5.5	1

- Calculate the dollar amount of interest that must be paid for each bond during the interest overlap period.
- Calculate the after-tax cost of overlapping interest for each bond if the company is in the 40% tax bracket.

A14-4. Interest payable during overlap = Coupon rate \times Principal \times [Months overlap \div 12]
 After-tax cost of overlapping interest = Interest during overlap period \times (1 – Tax rate)

Bond	Calculation of Interest Payable During Overlap Period	Interest Payable During Overlap Period	After-Tax Cost of Overlapping Interest
A	$\$5,000,000 \times 0.08 \times [3 \div 12]$	\$ 100,000	\$ 60,000
B	$40,000,000 \times 0.07 \times [2 \div 12]$	466,667	280,000
C	$50,000,000 \times 0.065 \times [3 \div 12]$	812,500	487,500
D	$100,000,000 \times 0.09 \times [6 \div 12]$	4,500,000	2,700,000
E	$20,000,000 \times 0.055 \times [1 \div 12]$	91,667	55,000

P14-5. Schooner Company is contemplating offering a new \$50 million bond issue to replace an outstanding \$50 million bond issue. The company wishes to take advantage of the decline in interest rates that has occurred since the initial bond issuance. The old and new bonds are described in what follows. The company is in the 40% tax bracket.

Old bonds. The outstanding bonds have a \$1,000 face value and a 9% coupon interest rate. They were issued five years ago with a 20-year maturity. They were initially sold for their face value of \$1,000, and the company incurred \$350,000 in flotation costs. They are callable at \$1,090.

New bonds. The new bonds would have a \$1,000 face value, a 7% coupon interest rate, and a 15-year maturity. They could be sold at their face value. The flotation cost of the new bonds would be \$500,000. The company does not expect to have any overlapping interest.

- Calculate the tax savings that are expected from the unamortised portion of the old bonds' flotation cost.

- b. Calculate the annual tax savings from the flotation cost of the new bonds, assuming the 15-year amortisation.
- c. Calculate the after-tax cost of the call premium that is required to retire the old bonds.
- d. Determine the initial investment that is required to call the old bonds and issue the new bonds.
- e. Calculate the annual cash flow savings, if any, that are expected from the proposed bond-refunding decision.
- f. If the company has a 4.2% after-tax cost of debt, find the net present value (NPV) of the bond-refunding decision. Would you recommend the proposed refunding? Explain your answer.

A14-5. Steps in bond refunding decision: (1) Calculate the initial investment required to call the old bond issue and float the new one; (2) Find the annual cash flow savings from the new versus old bond issue; and, (3) Find the net present value of refunding decision. Answers to parts (a)-(f) of this problem will be determined with this procedure.

(1) Finding the Initial Investment for the Bond Refunding Decision

(a) Call premium	
Before tax $[(\$1,090 - \$1,000) \times 50,000 \text{ bonds}]$	\$4,500,000
Less: Taxes $(0.40 \times \$4,200,000)$	<u>(1,800,000)</u>
After-tax cost of call premium	\$2,700,000
(b) Flotation cost of new bond	(500,000)
(c) Overlapping interest on old bond	
No overlapping interest payments	0
(d) Tax savings from unamortised discount on old bond	
The old bonds were issued at par, so no unamortised discount	0
(e) Tax savings from unamortised flotation of old bond	
$(15 \div 20 \times \$350,000 \times 0.40)$	<u>(105,000)</u>
Initial investment	<u>\$2,095,000</u>

(2) Finding the Annual Cash Flow Savings for the Bond Refunding Decision

Old bond

(a) Interest cost	
Before tax $(0.09 \times \$50,000,000)$	\$4,500,000
Less: Taxes $(0.40 \times \$4,500,000)$	<u>(1,800,000)</u>
After-tax interest cost	\$2,700,000
(b) Tax savings from amortisation of discount	
Bonds were sold at face value so no discount to amortise	0
(c) Tax savings from amortisation of flotation cost	
$[(\$350,000 \div 20) \times 0.40]$	<u>(7,000)</u>
(1) Annual after-tax debt payment	<u>\$2,693,000</u>

New bond

(d) Interest cost	
Before tax $(0.07 \times \$50,000,000)$	\$3,500,000
Less: Taxes $(0.40 \times \$3,500,000)$	<u>(1,400,000)</u>
After-tax interest cost	\$2,100,000

(e) Tax savings from amortisation of flotation cost	
$[(\$500,000 \div 15) \times 0.40]$	<u>(13,333)</u>
(2) Annual after-tax debt payment	<u>\$2,086,667</u>
Annual cash flow savings $[(1) - (2)]$	<u>\$ 606,333</u>

(3) Finding the Net Present Value of the Bond Refunding Decision

(a) Present value of annual cash flow [from part (2)]	
$\$606,333 \times PVA_{4.2\%, 15 \text{ years}}$	\$6,648,142
(b) Less: Initial investment (from (1))	<u>(2,095,000)</u>
(c) Net present value (NPV) of refunding	<u>\$4,553,142</u>

Decision: The proposed refunding is recommended because the NPV of refunding of \$4,553,142 is greater than \$0.

P14-6. High-Gearing is considering offering a new \$40 million bond issue to replace an outstanding \$40 million bond issue. The company wishes to take advantage of the decline in interest rates that has occurred since the original issue. The two bond issues are described in what follows. The company is in the 40% tax bracket.

Old bonds. The outstanding bonds have a \$1,000 face value and a 10% coupon interest rate. They were issued five years ago with a 25-year maturity. They were initially sold at a \$25 per bond discount, and a \$200,000 flotation cost was incurred. They are callable at \$1,100.

New bonds. The new bonds would have a 20-year maturity, a face value of \$1,000, and a 7.5% coupon interest rate. It is expected that these bonds can be sold at par for a flotation cost of \$250,000. The company expects a three-month period of overlapping interest while it retires the old bonds.

- Calculate the initial investment that is required to call the old bonds and issue the new bonds.
- Calculate the annual cash flow savings, if any, expected from the proposed bond-refunding decision.
- If the company uses its 4.5% after-tax cost of debt to evaluate low-risk decisions, find the net present value (NPV) of the bond-refunding decision. Would you recommend the proposed refunding? Explain your answer.

A14-6. Steps in bond refunding decision: (1) Calculate the initial investment required to call the old bond issue and float the new one; (2) Find the annual cash flow savings from the new versus old bond issue; and, (3) Find the net present value of refunding decision. Answers to parts (a)-(f) of this problem will be determined with this procedure.

(1) Finding the Initial Investment for the Bond Refunding Decision

(a) Call premium	
Before tax $[(\$1,100 - \$1,000) \times 40,000 \text{ bonds}]$	\$4,000,000
Less: Taxes $(0.40 \times \$4,000,000)$	<u>(1,600,000)</u>
After-tax cost of call premium	\$2,400,000
(b) Flotation cost of new bond	250,000
(c) Overlapping interest on old bond	
$0.10 \times \$40,000,000 \times 3/12 \times (1 - 0.4)$	600,000
(d) Tax savings from unamortised discount on old bond	
$-\$25/25 \times 20 \times 40,000 \times 0.40$	<u>(320,000)</u>

(e) Tax savings from unamortised flotation of old bond ($20 \div 25 \times \$200,000 \times 0.40$)	(64,000)
Initial investment	<u>\$2,866,000</u>

(2) Finding the Annual Cash Flow Savings for Bond Refunding Decision

Old bond

(a) Interest cost	
Before tax ($0.10 \times \$40,000,000$)	\$4,000,000
Less: Taxes ($0.40 \times \$4,000,000$)	(1,600,000)
After-tax interest cost	\$2,400,000
(b) Tax savings from amortisation of discount – $\$25/25 \times 40,000 \times 0.40$	(16,000)
(c) Tax savings from amortisation of flotation cost [($\$200,000 \div 25$) $\times 0.40$]	(3,200)
(1) Annual after-tax debt payment	<u>\$2,380,800</u>

New bond

(d) Interest cost	
Before tax ($0.075 \times \$40,000,000$)	\$3,000,000
Less: Taxes ($0.40 \times \$3,000,000$)	(1,200,000)
After-tax interest cost	\$1,800,000
(e) Tax savings from amortisation of flotation cost [($\$250,000 \div 20$) $\times 0.40$]	(5,000)
(2) Annual after-tax debt payment	<u>\$1,795,000</u>
Annual cash flow savings [(1) – (2)]	<u>\$ 585,800</u>

(3) Finding the Net Present Value of the Bond Refunding Decision

(a) Present value of annual cash flow [from part (2)] $\$585,800 \times PVA_{4.5\%, 20 \text{ years}}$	\$7,620,049
(b) Less: Initial investment (from (1))	(2,866,000)
(c) Net present value (NPV) of refunding	<u>\$4,754,049</u>

Decision: The proposed refunding is recommended because the NPV of refunding of \$4,754,049 is greater than \$0.

- P14-7.** Web Tools Company is considering using the proceeds from a new \$50 million bond issue to call and retire its outstanding \$50 million bond issue. The details of both bond issues are outlined in what follows. The company is in the 40% tax bracket.
- Old bonds.** The company's old issue has a coupon interest rate of 10%, was issued four years ago, and had a 20-year maturity. The bonds sold at a \$10 discount from their \$1,000 face value, flotation costs were \$420,000, and their call price is \$1,100.
- New bonds.** The new bonds are expected to sell at face value (\$1,000), have a 16-year maturity, and have flotation costs of \$520,000. The company will have a two-month period of overlapping interest while it retires the old bonds.
- a. What is the initial investment that is required to call the old bonds and issue the new bonds?

- b. What are the annual cash flow savings, if any, from the proposed bond-refunding decision if the new bonds have an 8% coupon interest rate? If the new bonds have a 9% coupon interest rate?
- c. Construct a table showing the net present value (NPV) of refunding under the two circumstances given in part (b) when (1) the company's after-tax cost of debt is 4.8% [$0.08 \times (1 - 0.40)$] and (2) this cost is 5.4% [$0.09 \times (1 - 0.40)$].
- d. Given the circumstances described in part (c), discuss when refunding would be favourable and when it would not.
- e. If the two circumstances summarised in your answer to part (d) were equally probable (each had a probability of 50%), would you recommend refunding? Explain your answer.

A14-7. 8% coupon interest, 4.8% after-tax cost of debt**(1) Finding the Initial Investment for the Bond Refunding Decision**

(a) Call premium	
Before tax [$(\$1,100 - \$1,000) \times 50,000$ bonds]	\$5,000,000
Less: Taxes ($0.40 \times \$5,000,000$)	(2,000,000)
After-tax cost of call premium	\$3,000,000
(b) Flotation cost of new bond	520,000
(c) Overlapping interest on old bond	
$0.10 \times \$50,000,000 \times 2/12 \times (1 - .4)$	500,000
(d) Tax savings from unamortised discount on old bond	
$-\$10/20 \times 16 \times 50,000 \times .40$	(160,000)
(e) Tax savings from unamortised flotation of old bond	
$(16 \div 20 \times \$420,000 \times 0.40)$	(134,400)
Initial investment	<u>\$3,725,600</u>

(2) Finding the Annual Cash Flow Savings for the Bond Refunding DecisionOld bond

(a) Interest cost	
Before tax ($0.10 \times \$50,000,000$)	\$5,000,000
Less: Taxes ($0.40 \times \$5,000,000$)	(2,000,000)
After-tax interest cost	\$3,000,000
(b) Tax savings from amortisation of discount	
$-\$10/20 \times 50,000 \times .40$	(10,000)
(c) Tax savings from amortisation of flotation cost	
$[(\$420,000 \div 20) \times 0.40]$	(8,400)
(1) Annual after-tax debt payment	<u>\$2,981,600</u>

New bond

(d) Interest cost	
Before tax ($0.08 \times \$50,000,000$)	\$4,000,000
Less: Taxes ($0.40 \times \$4,000,000$)	(1,600,000)
After-tax interest cost	\$2,400,000
(e) Tax savings from amortisation of flotation cost	
$[(\$520,000 \div 16) \times 0.40]$	(13,000)
(2) Annual after-tax debt payment	<u>\$2,387,000</u>
Annual cash flow savings [(1) – (2)]	<u>\$ 594,600</u>

(3) Finding the Net Present Value of the Bond Refunding Decision

(a) Present value of annual cash flow [from part (2)] $\$594,600 \times PVA_{4.8\%, 16 \text{ years}}$	\$6,536,863
(b) Less: Initial investment (from (1))	<u>(3,725,600)</u>
(c) Net present value (NPV) of refunding	<u>\$2,811,263</u>

Decision: The proposed refunding is recommended because the NPV of refunding of \$2,811,263 is greater than \$0.

9.0% coupon interest, 5.4% after-tax cost of debt

(1) Finding the Initial Investment for the Bond Refunding Decision

(a) Call premium Before tax $[(\$1,100 - \$1,000) \times 50,000 \text{ bonds}]$ Less: Taxes $(0.40 \times \$5,000,000)$ After-tax cost of call premium	\$5,000,000 <u>(2,000,000)</u> \$3,000,000
(b) Flotation cost of new bond	520,000
(c) Overlapping interest on old bond $0.10 \times \$50,000,000 \times 2/12 \times (1 - .4)$	500,000
(d) Tax savings from unamortised discount on old bond $-\$10/20 \times 16 \times 50,000 \times .40$	<u>(160,000)</u>
(e) Tax savings from unamortised flotation of old bond $(16 \div 20 \times \$420,000 \times 0.40)$	<u>(134,400)</u>
Initial investment	<u>\$3,725,600 (same)</u>

(2) Finding the Annual Cash Flow Savings for the Bond Refunding Decision

Old bond

(a) Interest cost Before tax $(0.10 \times \$50,000,000)$ Less: Taxes $(0.40 \times \$5,000,000)$ After-tax interest cost	\$5,000,000 <u>(2,000,000)</u> \$3,000,000
(b) Tax savings from amortisation of discount $-\$10/20 \times 50,000 \times 0.40$	<u>(10,000)</u>
(c) Tax savings from amortisation of flotation cost $[(\$420,000 \div 20) \times 0.40]$	<u>(8,400)</u>
(1) Annual after-tax debt payment	<u>\$2,981,600 (same)</u>

New bond

(d) Interest cost Before tax $(0.09 \times \$50,000,000)$ Less: Taxes $(0.40 \times \$4,500,000)$ After-tax interest cost	\$4,500,000 <u>(1,800,000)</u> \$2,700,000
(e) Tax savings from amortisation of flotation cost $[(\$520,000 \div 16) \times 0.40]$	<u>(13,000)</u>

(2)	Annual after-tax debt payment	<u>\$2,687,000</u>
	Annual cash flow savings [(1) – (2)]	<u>\$ 294,600</u>

(3) Finding the Net Present Value of the Bond Refunding Decision

(a)	Present value of annual cash flow [from part (2)] $\$294,600 \times PVA_{5.4\%, 16 \text{ years}}$	\$3,103,816
(b)	Less: Initial investment [(from (1))]	<u>(3,725,600)</u>
(c)	Net present value (NPV) of refunding	<u>\$ -621,784</u>

Decision: The proposed refunding is not recommended because the NPV of refunding is negative.

It is not worthwhile to refund if the new coupon rate is 9%.

- e. Given the equal probability of 8% and 9% coupon rates, the expected NPV is: $50\% \times (2,811,263) + 50\% \times (-621,784) = 1,094,739.50$. In this case, because the expected NPV is positive, refunding is recommended.

Leasing

P14-8. Given the lease payments and terms shown in the following table, determine the yearly after-tax cash outflows for each company. Assume that lease payments are made at the *beginning of each year*, that the company is in the 40% tax bracket, and that no purchase option exists.

Company	Annual Lease Payment	Term of Lease
A	\$ 250,000	5 years
B	160,000	12
C	500,000	8
D	1,000,000	20
E	25,000	6

A14-8. The yearly after tax cash flows are the lease payment \times (1–Tax rate)

Company	Lease Payment	After-Tax Cash Flow
A	\$ 250,000	\$150,000
B	160,000	96,000
C	500,000	300,000
D	1,000,000	600,000
E	25,000	15,000

P14-9. GMS Company is attempting to determine whether to lease or purchase research equipment. The company is in the 40% tax bracket, and its after-tax cost of debt is currently 6%. The terms of the lease and the purchase are as follows:

Lease. Annual beginning-of-year lease payments of \$93,500 are required over the 3-year life of the lease. The lessee will exercise its option to purchase the asset for \$25,000, to be paid along with the final lease payment.

Purchase. The \$250,000 cost of the research equipment can be financed entirely with a 10% loan requiring annual end-of-year payments of \$100,529 for three years. The company in this case will depreciate the equipment using the straight-line method for three years. The company plans to keep the equipment and use it beyond its 3-year recovery period.

- Calculate the after-tax cash outflows associated with each alternative.
- Calculate the present value of each cash outflow stream using the after-tax cost of debt.

c. Which alternative – lease or purchase – would you recommend? Why?

A14-9. Leasing the Research Equipment

Beginning of period lease payment: \$93,500

After-tax lease payment = $93,500 \times (1 - 0.4) = \$56,100$

N = 3 years

After-tax cost of debt: 6%

Present value of lease cash flows: $-56,100 - 56,100/1.06 - 81,100/(1.06)^2 = \underline{\underline{-\$181,203}}$

Purchasing the Equipment

\$250,000 equipment cost

Depreciation, based on MACRS table:

Year 1: $33\% \times 250,000 = \$82,500$

Year 2: $45\% \times 250,000 = \$112,500$

Year 3: $15\% \times 250,000 = \$37,500$

Year 4: $7\% \times 250,000 = \$17,500$

Loan interest and principal:

Principal Balance	Payment	Interest	Principal	Ending Principal
\$250,000	\$100,529	\$25,000	\$75,529	\$174,471
174,471	100,529	17,447	83,082	91,389
91,389	100,529	9,139	91,389	0

Loan cash flows:

Note that there are no inflows (revenues) given for the project. The cash inflows are the tax shields from depreciation and interest, the amount paid times the tax rate of 40%.

Maintenance costs: \$9,500

After-tax cost of maintenance: $\$9,500 \times (1 - 0.4) = \$5,700$

After-tax cash outflows associated with purchasing the research equipment:

End of Year	Loan Payments (1)	Maint. Costs (2)	Deprec. (3)	Interest (4)	Total Deductions (2)+(3)+(4)=(5)	Tax Shields $0.40 \times 5 = (6)$	After-Tax Cash Outflows (1)+(2)-(6)=(7)
1	\$100,529	\$9,500	\$82,500	\$25,000	\$117,000	\$46,800	\$63,229
2	100,529	9,500	112,500	17,447	139,447	55,779	54,250
3	100,529	9,500	37,500	9,139	56,139	22,456	87,573

Discounting the after-tax cash outflows at 6.0%: $\underline{\underline{-\$181,460}}$

Since the present value of the after-tax cash outflows for the purchase alternative, $-\$181,460$, is slightly more than for the lease alternative, $-\$181,203$, it is less costly to lease than to purchase the equipment. This ignores the depreciation deduction for the purchase option for year 4, as well as year-4 maintenance payments made under the lease option after the asset is purchased in year 5. This might well make the purchase option somewhat more attractive.

P14-10. Eastern Transport Company needs to expand its facilities. In order to do so, the company must acquire a machine costing \$80,000. The machine can be leased or purchased. The company is in the 40% tax bracket, and its after-tax cost of debt is 5.4%. The terms of the lease and purchase plans are as follows:

Lease. The leasing arrangement requires beginning-of-year payments of \$16,900 over five years. The lessee will exercise its option to purchase the asset for \$20,000, to be paid along with the final lease payment.

Purchase. If the company purchases the machine, its cost of \$80,000 will be financed with a 5-year, 9% loan requiring equal end-of-year payments of \$20,567. The machine will be depreciated on a straight-line basis for five years. The company plans to keep the equipment and use it beyond its 5-year recovery period.

- Determine the after-tax cash outflows of Eastern Transport under each alternative.
- Find the present value of the after-tax cash outflows for each alternative using the after-tax cost of debt.
- Which alternative – lease or purchase – would you recommend? Why?

A14-10. Leasing the Machine:

Lease payment: \$16,900

After-tax payment: $\$16,900 \times 0.6 = \$10,140$

Present value of lease cost:

$$-\$10,140 - 10,140 / 1.054 - 10,140 / (1.054)^2 - 10,140 / (1.054)^3 - 30,140 / (1.054)^4 = \underline{\underline{-\$61,970}}$$

Purchase the Machine:

Depreciation, using US tax-based Modified Accelerated Cost Recovery System (MACRS) tables (Chapter 10)

Year 1:	$20\% \times 80,000 =$	\$16,000
Year 2:	$32\% \times 80,000 =$	25,600
Year 3:	$19.2\% \times 80,000 =$	15,360
Year 4:	$11.52\% \times 80,000 =$	9,216
Year 5:	$11.52\% \times 80,000 =$	9,216
Year 6:	$5.76\% \times 80,000 =$	4,608

Loan Interest

Principal	Payment	Interest	Principal Paid	Ending Balance
\$80,000	\$20,567	\$7,200	\$13,367	\$66,633
66,633	20,567	5,997	14,570	52,063
52,063	20,567	4,686	15,881	36,182
36,182	20,567	3,256	17,311	18,871
18,871	20,567	1,698	18,869	0

Maintenance costs: \$2,000/Year

After-tax expense: $\$2,000 \times (1 - 0.4) = \$1,200$

After-tax cash outflows associated with purchasing the telephone system:

End of Year	Loan Payments (1)	Maint. Costs (2)	Deprec (3)	Interest (4)	Total Deductions 2+3+4=(5)	Tax Shields $0.40 \times 5 = (6)$	After-Tax Cash Outflows $1+2-6=(7)$
1	\$20,567	\$2,000	\$16,000	\$7,200	\$25,200	\$15,120	\$ 7,447
2	20,567	2,000	25,600	5,997	33,597	13,438	9,128
3	20,567	2,000	15,360	4,686	22,046	8,818	13,749
4	20,567	2,000	9,216	3,256	14,472	5,789	16,778
5	20,567	2,000	9,216	1,698	12,914	5,166	17,401

Discounting the after-tax cash outflows at 5.4%: $-\$53,997$

Since the present value of the after-tax cash outflows for the purchase alternative, -\$53,997, is less than for the lease alternative, -\$61,970, it is less costly to purchase than to lease the equipment. This ignores the depreciation deduction for the purchase option for year 6, as well as year-6 maintenance payments made under the lease option after the asset is purchased in year 5.

P14-11. Given the lease payments, terms remaining until the leases expire, and discount rates shown in the following table, calculate the capitalised value of each lease. Assume that lease payments are made annually at the beginning of each year.

Lease	Lease Payment	Remaining Term	Discount Rate
A	\$ 40,000	12 years	10%
B	120,000	8	12
C	9,000	18	14
D	16,000	3	9
E	47,000	20	11

A14-11.

Lease	Lease Payment	Remaining Term	Discount Rate	Value
A	\$ 40,000	12	10%	\$299,802
B	120,000	8	12%	667,651
C	9,000	18	14%	66,356
D	16,000	3	9%	44,146
E	47,000	20	11%	415,447

For each valuation, the payment is the lease payment (which occurs at the beginning of each period), N is the remaining term and I% is 10%.

Answer to MiniCase

Long-Term Debt and Leasing

The CFO of your company asks you to review the long-term debt position of the company to decide if the company should make any changes in its borrowing arrangements. Before conducting this review you decide to bring yourself up to date on terminology and types of long-term borrowing arrangements.

Therefore, as a start you decide to answer the following questions.

1. What types of debt covenants might managers consider?
2. What are the major factors that affect the cost or interest rate of a debt instrument?
3. What are term loans, and what are their characteristics?
4. What are syndicated loans and what are the primary applications?
5. What are some of the legal arrangements used to protect lenders related to corporate bonds?
6. What are some of the general features of corporate bonds?
7. What are the options available for a company that wishes to avoid a large single repayment of principal in the future or to refund a bond prior to maturity?
8. In what ways are leases similar to long-term debt?
9. What are the two basic types of leases?
10. What are the advantages and disadvantages of leasing?

Answers

1. There are two general types of covenants, positive covenants that require the borrower to take a specific action, and negative covenants that prohibit certain actions. Some of the most common positive covenants require the borrower to do the following, (a) maintain satisfactory accounting records, (b) supply audited financial statements, (c) pay taxes and other liabilities when due, (d) maintain all facilities in good working order, (e) maintain a minimum level of net working capital, (f)

maintain life insurance policies on certain 'key employees,' and (g) spend the borrowed funds on a proven financial need. Some common negative covenants require that the borrower does not do the following: (a) sell accounts receivable to generate cash, (b) borrow additional long-term debt, (c) enter into certain types of leases, (d) consolidate, merge, or combine in any way with another company, (e) liquidate assets, and (f) pay a cash dividend in excess of 50-70 per cent of its net earnings.

2. The major factors affecting the cost or interest rate of long-term debt are loan maturity, loan size, borrower risk, and the basic cost of money. Loan maturity is a factor since long-term loans typically have higher interest rates than short-term loans primarily because yield curves are most often upward sloping. Loan size is usually inversely related to the interest cost of borrowing since loan administration costs per dollar borrowed are likely to decrease with increasing loan size. The higher the borrower's debt ratio or the lower its interest coverage ratio, the greater the borrower's risk, which equates to the necessity to pay higher rates. The basic cost of money starts with the rate on US Treasury securities of an equivalent maturity with premiums added for borrower risk and other factors to this basic cost of money for the given maturity.
3. A term loan is made by an institution to a business and has an initial maturity of more than 1 year, generally 5 to 12 years. The following items commonly appear in the loan document: the amount and maturity of the loan, payment dates, interest rate, positive and negative covenants, collateral (if any), purpose of the loan, action to be taken in the event the agreement is violated, and share purchase warrants. Term loan agreements usually specify monthly, quarterly, semiannual, or annual loan payments. Term lending arrangements may be unsecured or secured. Secured loans have specific assets pledged as collateral. Most pledged assets are secured by a lien, which is a legal contract specifying under what conditions the lender can take title to the asset if the loan is not repaid, and prohibiting the borrowing company from selling or disposing of the asset without the lender's consent.
Share purchase warrants are instruments that give their holder the right to purchase a certain number of shares of the company's ordinary shares at a specified price over a certain period.
4. A syndicated loan is large-denomination credit arranged by a group (syndicate) of commercial banks for a single borrower. The syndicated loan market appeals to borrowers who need to arrange very large loans quickly. Two primary uses of syndication include Eurocurrency lending and project finance. The Eurocurrency loan market consists of a large number of international banks that stand ready to make floating-rate, hard-currency loans (typically, US dollar-denominated) to international corporate and government borrowers. Most large loans (over \$500 million) are syndicated, thereby providing a measure of diversification to the lenders. Project finance (PF) loans are typically arranged for infrastructure projects, such as, toll roads, bridges, power plants, seaports, tunnels, and airports, that require large sums to construct but which, once built, generate significant amounts of free cash flow for many years.
5. A bond indenture is a complex and lengthy legal document stating the conditions under which a bond has been issued. It specifies both the rights of the bondholders and the duties of the issuing company. An additional positive covenant often included in a bond indenture is a sinking fund requirement, with the objective of providing for the systematic retirement of bonds prior to their maturity. The bond indenture is similar to a loan agreement in that any collateral pledged against the bond is specifically identified in the document. A trustee is a third party to a bond indenture and can be an individual, a company, or, most often, a commercial bank trust department. The trustee, whose services are paid for by the issuer, acts as a 'watchdog' on behalf of the bondholders, making sure that the issuer does not default on its contractual responsibilities.
6. Three features commonly observed in a US bond issue are (a) a call feature, (b) a conversion feature, and (c) share purchase warrants. The call feature is included in most corporate bond issues and gives the issuer the opportunity to repurchase bonds prior to maturity. The conversion feature of

convertible bonds allows bondholders to change each bond into a stated number of ordinary shares. Like term loans, bonds occasionally have warrants attached as 'sweeteners' to make them more attractive to prospective buyers.

7. The borrower can issue serial bonds, where a certain proportion of the bond matures each year. When companies issue serial bonds, they attach different interest rates to bonds maturing at different times. Although serial bonds cannot necessarily be retired at the option of the issuer, they do permit the issuer to systematically retire the debt. As another option, if interest rates drop following the issuance of a bond, the issuer may wish to refund (refinance) the debt with new bonds at the lower interest rate. Finally, for those bonds with a call feature the issue can easily be retired as the need arises.
8. You can think of a lease as being comparable to secured long-term debt, because in both cases there is an underlying asset tied to the company's financial obligation. The lessee uses the underlying asset and makes regular payments to the lessor, who retains ownership of the asset.
9. The two basic types of leases available to a business are operating leases and finance leases. An operating lease is typically a contractual arrangement whereby the lessee agrees to make periodic payments to the lessor, often for five years or less, to obtain an asset's services. The lessee generally receives an option to cancel the lease by paying a cancellation fee. A finance lease is longer term than an operating lease. Finance leases are non-cancellable and therefore obligate the lessee to make payments over a predefined period.
10. The advantages of leasing are (a) the ability of the lessee to depreciate land, which is prohibited if the land were purchased, (b) the use of sale-leaseback arrangements may permit the company to increase its liquidity by converting an asset into cash, which can then be used as working capital, (c) leasing provides 100 per cent financing, (d) the maximum claim of lessors if a lessee becomes insolvent is three years of lease payments along with reclaiming the asset, (e) the lessee may avoid the cost of obsolescence if the lessor fails to accurately anticipate the obsolescence of assets and sets the lease payment too low, (f) the lessee avoids many of the restrictive covenants that are usually included as part of a long-term loan, and (g) in the case of low-cost assets leasing may provide the company with needed financing flexibility.

The disadvantages of leasing are (a) a lease does not have a stated interest cost, (b) at the end of the term of the lease agreement, the lessor realises the salvage value, (c) the lessee is generally prohibited from making improvements on the leased property or asset without the approval of the lessor, and (d) if a lessee leases an asset that subsequently becomes obsolete, it still must make lease payments over the remaining term of the lease.